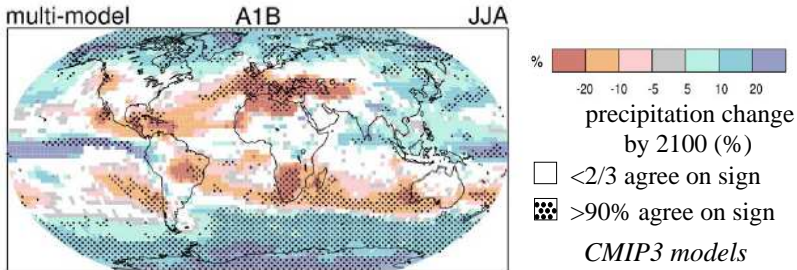# Link between past and future precipitation changes in tropical South America based on CMIP5 simulations

Camille Risi, Sandrine Bony, Françoise Vimeux
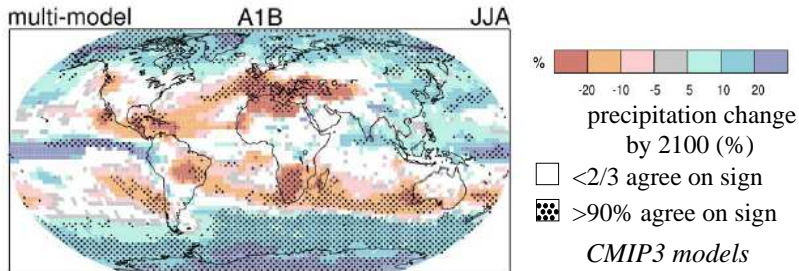
LMD/IPSL/CNRS

Journées Missterre, 21 November 2011

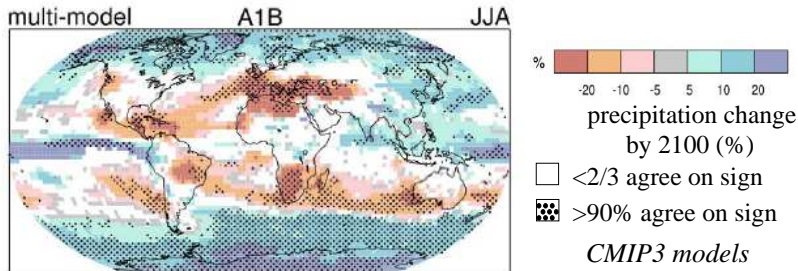# Spread in precipitation projections

Spread in precipitation projections

multi-model A1B JJA

precipitation change by 2100 (%)
- □ <2/3 agree on sign
- ▨ >90% agree on sign

CMIP3 models

▶ Can we assess the credibility of future precip projections of tropical precip using past changes?
  ▶ if a model is better for the past, is it better for the future?
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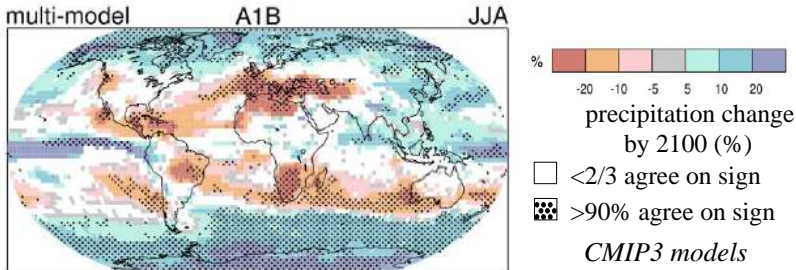▨ >90% agree on sign
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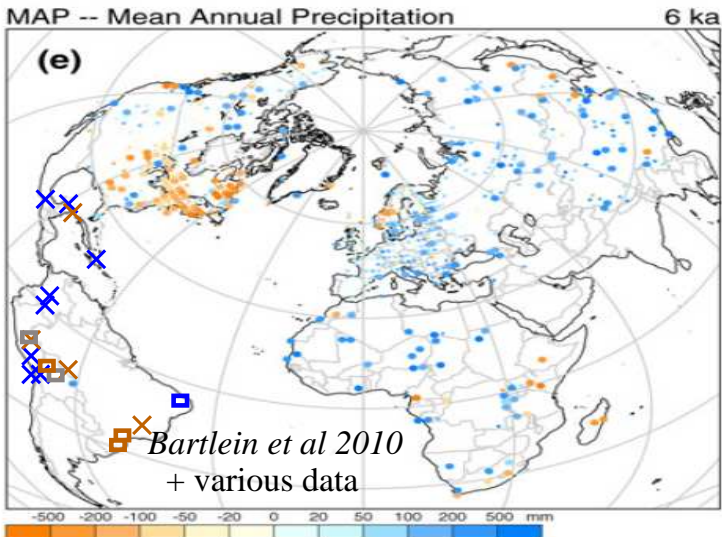   - ▶ Are there common mechanisms?
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- ▶ Focus on tropical South America
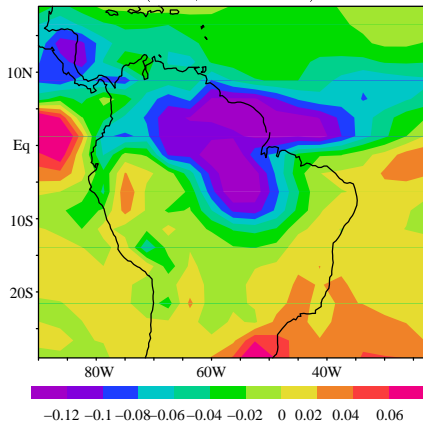- ▶ 9 models with MH, 4 models with LGM ⇒ focus on MH

Mid Holocene (6ka)

▶ orbital forcing, little CO_2 and temperature changes

MAP -- Mean Annual Precipitation   6 ka

(e)

Bartlein et al 2010
+ various data

-500 -200 -100 -50 -20   0   20   50 100 200 500 mm
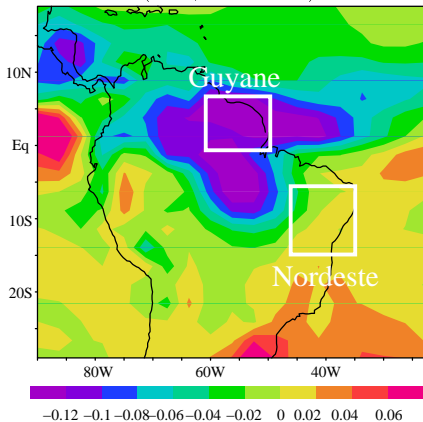
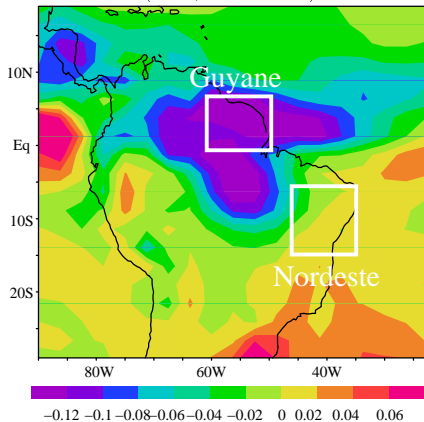# Multi-model EOF of future precip changes

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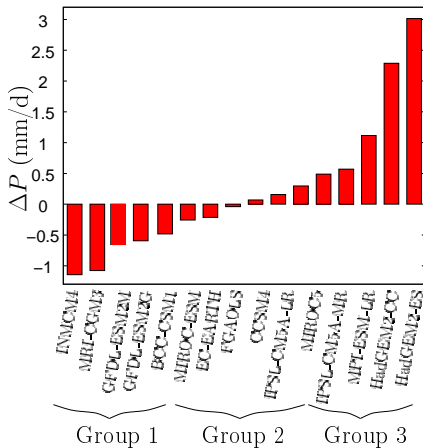(86%, 16 models)

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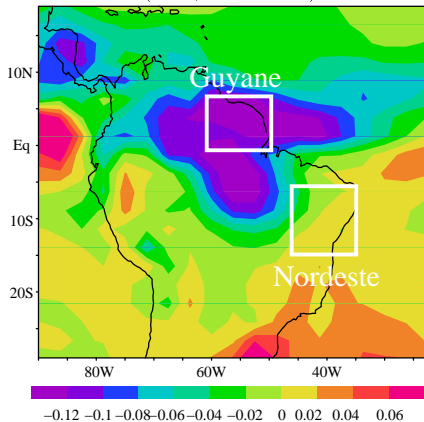
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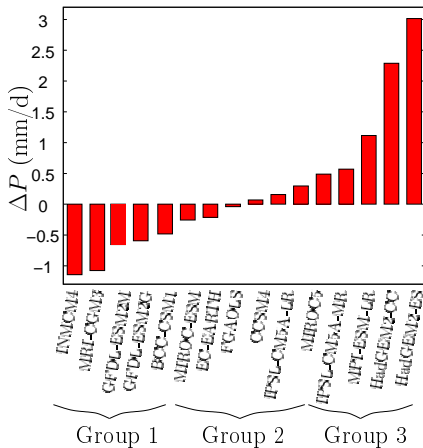
$\Rightarrow$ composites for $\neq$ groups, correlation ΔP index vs other indices

Link between future climate and MH

group 1   group 3

RCP85–PI

MH–PI

−1.5 −1 −0.7 −0.4 −0.2 0.2 0.4 0.7 1 1.5   r=0.93

Annual mean precipitation change (mm/d)

Link with Atlantic SSTs

group 1   group 3

Annual mean precipitation change (mm/d)

surface temperature change
(normalised by tropical mean SST)

r=0.67
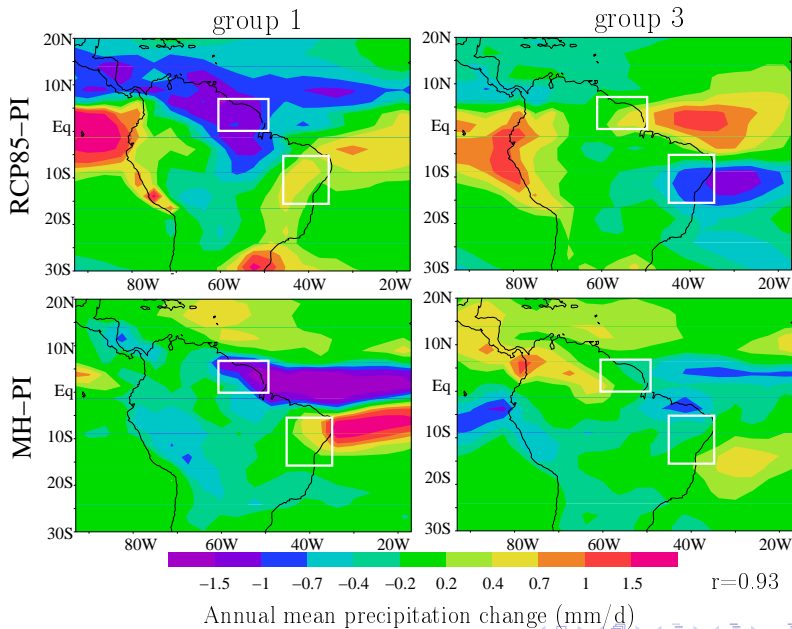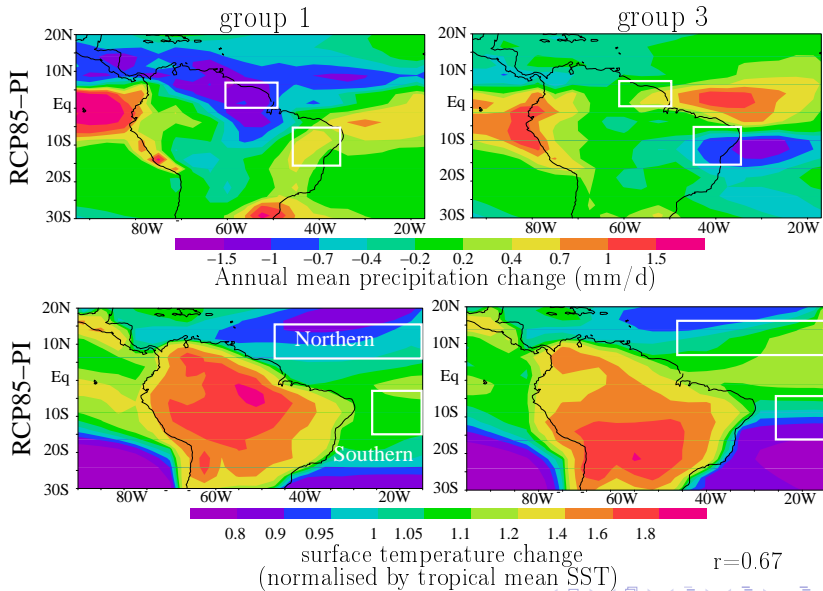
Link with direct CO2 effect

- sstClim4xCO2 vs sstClim
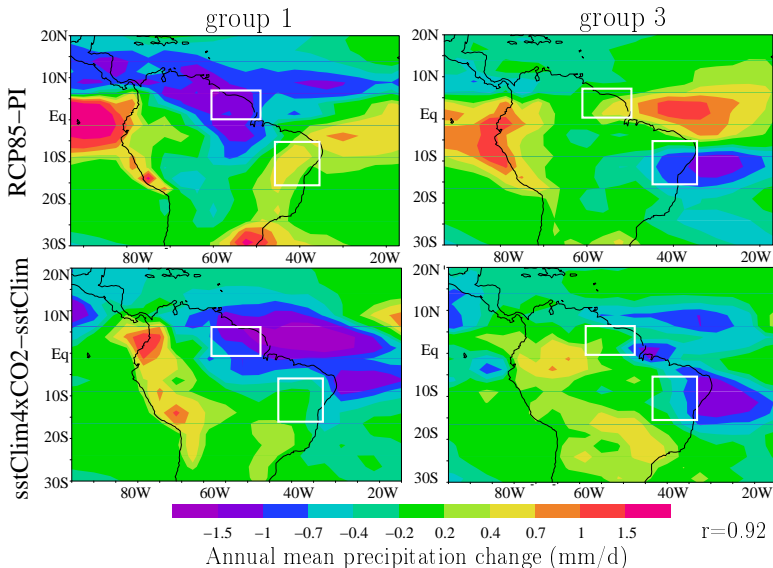
Annual mean precipitation change (mm/d)

r=0.92

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In models where precip decreases in Guyane and increases in Nordeste in RCP8.5:

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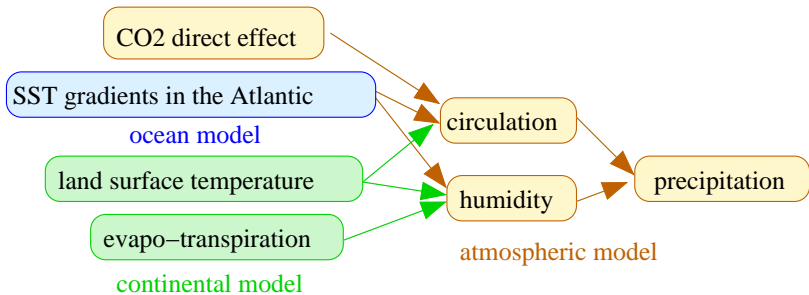

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   ▶ Will be continued within ANR ISOTROPIC of F. Vimeux